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ABSTRACT

Traditionally, trade and industrial education teachers performed their own job analyses in order to develop a curriculum and teach their classes. Eventually, processes were created for such analyses. One that had a great influence in educational circles was the job analysis system of Fryklund. However, since Fryklund's time, occupational analysis systems have become increasingly complex; today, many teachers rely exclusively on prepackaged materials for occupational analysis and curriculum development. However, it should be remembered that occupational analysis does more than aid in developing the curriculum; it also aids teachers in "thinking analysis" as a teaching and management methodology. This second goal should be an extremely important aspect of any trade and technical teacher preparatory program. Since prepared curricula are available, teachers no longer have a need to analyze an entire program for curriculum development. However, they should be provided the practice in performing an analysis so that they fully understand the concepts involved. In addition, packaged occupational analysis systems and curriculum guides have become increasingly complicated and will eventually become less useful. Teachers become "turned off" when a system becomes so time consuming that it gets in the way of providing good instruction. The development of occupational analysis and the use of prepackaged curricula may have reached the point of diminishing returns. It should not be forgotten that trade and industrial teachers and technical teachers have had a superior analysis system for over 40 years. They should continue processes that are of most benefit to themselves and their students. (KC)

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ARE WE REALLY TEACHING OCCUPATIONAL ANALYSIS?

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Are We Really Teaching Occupational Analysis?

A recent survey (Duenk, 1985) indicated that the content of Occupational Analysis appears to be merging with required and or elective curriculum courses in Trade and Technical Teacher Education preparatory programs. It appears that the content of Occupational Analysis, long considered to be fundamental in its own right, is being viewed increasingly as a concomitant activity of the curriculum development process. Further data on the trends and perceived importance of Occupational Analysis which were derived from the survey are found in Tables 1 & 2. Inasmuch as these data are self-explanatory and the ensuing discussion is of a historical and philosophical nature, no attempt will be made to interpret the data or address the topic in terms of research implications or adaptability. The survey is viewed simply as a point of direction for the following discussion which deals with our past heritage in occupational analysis and the direction in which we appear to be going.

The survey included both T & I and Technical Education Teacher preparatory programs. It proved difficult to separate these occupational preparatory

TABLE 1

SURVEY OF OCCUPATIONAL ANALYSIS INSTRUCTION IN TRADE AND TECHNICAL TEACHER PREPARATION PROGRAMS N=121

	No. of Trade & Tech Ed. Teacher Prep. Programs		Level of Course			
	Yes	No	Cert.	A.S.	B.S.	Grad
Occupational Analysis taught as a separate course at some level(s) (required)	55	66	*8	0	55	1
Occupational Analysis taught as a separate course at some level(s) (elective)	2	119	2	2	2	1
Occupational Analysis taught as part of a curriculum course at some level(s) (required).	81	40	**17	2	52	12
Occupational Analysis taught as a part of a curriculum course at some level(s) (elective)	14	107	1	0	11	11

*Duplicity occurs because many institutions have both an analysis course at the Certification and/or B. S. degree level and a combination Occupational Analysis - Curriculum Course at the graduate level. Course may be required at one out of 2 or 3 levels.

**Duplicity occurs because an analysis course may be required at one level and as an elective at another level at the same institution.

TABLE 2

PERCEPTIONS OF CHAIRPERSONS OF TRADE AND TECHNICAL TEACHER EDUCATION PREPARATORY PROGRAMS N=121

	No. of Trade and Technical Ed. Teacher Preparation Programs				
	Elective	Required	No Opinion	Should Not Be Taught	Exposure Only
Should occupational analysis be elective or required?	21	70	27	2	1

	Yes	No	No Opinion
Does Occupational Analysis have sufficient content to be a separate course?	*69	45	7

*one respondent indicated "For T & I only".

programs in the survey data because many institutions either combine them or have very similar professional course requirements.

Trade and Industrial Education is credited with originating occupational analysis as a system for breaking down content in industry and in public occupational training programs. A review of the literature and conversations with Trade and Technical teachers who have been involved with both the traditional and

contemporary analysis systems would indicate that the traditional analysis systems possessed some aspects which are superior, in a strictly useful sense, to the numerous analysis systems which we are encountering today as part of the Competency Based Vocational Education movement. Because Trade and Industrial Education has successfully utilized a competency based approach for over forty years, long before the present CBVE movement, this heritage should not be lost in the present shuffle to produce complex, abstract types of analyses which appear to lack the practicality and time efficiency required for already overworked laboratory teachers.

Let us regress back to the beginning of the analysis movement in America. In 1917, Charles Allen introduced a job analysis approach for training skilled workers at Newport News (Va) Drydocks and Shipbuilding Company (Allen, 1922). During World War I, there was a serious shortage of skilled workers and the "hit or miss" system of training which was then in use, took too long to accomplish in the wake of a national emergency. Allen, who was Superintendent of Instructor Training, U. S. Emergency Fleet Corporation, developed a scientific job analysis system which enabled production workers to be trained in about 60 percent of the time which had been previously required.

Allen divided the Industry Department Analysis into three categories: (1) Department production jobs

(2) Payroll jobs, and (3) Work jobs. He emphasized the Work job aspect of the analysis, further delineating this category into safety analysis, supervisory analysis, instructional analysis, and job requirement analysis. His basic contention was that each of the aforementioned breakdowns could be further broken down into operations (segments of a job) and the operations broken down into machine and human operating points (Table 3)

TABLE 3

FIRST ANALYSIS SYSTEM DEVISED BY CHARLES ALLEN

Operations	Operating Points	
	Machine	Human
Operation 1	Point No. 1	
		Point No. 2
		Point No. 3
	Point No. 4	
	Point No. 5	
		Point No. 6
	Point No. 7	
		Point No. 8
Operation 2	Point No. 1	
	Point No. 2	
		Point No. 3
	Point No. 4	
		Point No. 5

Analysis formats were developed and job analysis supervisors were employed to analyze each "work job" in a department. Analysis supervisors then proceeded to write efficient training programs based upon the analysis. Later developments led to inclusion of the safety analysis, originally a separate component, as a part of

the work job analysis.

Allen's contribution caused the old trial and error method to become obsolete. The problems of leaving out, duplicating, or overlapping learning steps and key points were all but eliminated. His work was hailed by the Federal Government as being meritorious in nature and he was the receipient of great acclaim for his contribution to national defense. His system was soon adopted by civilian industries and the period of 1920 to 1941 witnessed a great change in concepts of industry training. The greater efficiency in training programs resulted in commensurate financial savings and increased production for American industry.

Others followed through on Allen's original concept. One of the more notable was Robert W. Selvidge. He re-worked Allen's system (Selvidge and Fryklund, 1941) and later joined Verne C. Fryklund in developing a simplified system suitable for public school programs.

Fryklund is often thought of as the father of occupational analysis because he was instrumental in promoting the analysis concept as a basis for curriculum construction in the public schools. Fryklund, in 1942 wrote a book entitled Occupational Analysis Procedures and Techniques (Fryklund, 1942) which remained in print through six revisions from 1942 to 1983. The book was translated into five languages and the Fryklund system became a basis for

public school industrial education programs and industrial training programs throughout the world.

The Fryklund system was originally developed at Fort Knox, Kentucky for military training purposes. Fryklund was President of Stout Institute at Menomonie, Wisconsin following World War II and was in an excellent position to promote his very practical analysis concept among future industrial arts and T & I teachers who were enrolled in degree programs. Basically, his system was one of breaking an occupation down cumulatively into blocks, jobs, doing lesson titles, knowing lesson titles, steps (or topics) and key points. The Fryklund analysis breakdown is shown in Table 4.

The basic concept of Fryklund's analysis system was to break down technical information and skills into elemental points which, when learned well, could be combined into larger units of work called jobs. If enough of these elemental steps/topics were mastered, the student could combine them into the performance of jobs (competencies) which comprised an occupation. Charts were made from the analysis which graphically depicted the relationship among these elements (called operations) and larger units called jobs. An example of a psychomotor analysis chart showing selected operations and jobs is shown in Table 5. These analysis charts were completed con-

currently with the breakdown shown in Table 4.

Insert Table 4 & 5 here

Note that the basic operations found in occupations were listed vertically, proceeding from the most frequently used to the least frequently used in the occupation. The jobs were then listed horizontally across the top of the chart. By checking off the operations which were found in the jobs, it was possible to determine which operations should be taught, as well as the correct order of teaching. Furthermore, the system helped to eliminate skips and overlaps in the flow of instruction.

Fryklund's analysis technique became a standard mode for breaking down content for the purpose of curriculum development as well as developing analytical teaching and management skills. This was particularly evident in the Midwest, where his approach had great influence on the industrial education curriculum. One must remember that during the post World War II era, published analyses for use in schools were not available. The few published curriculum guides which were available tended to be rather sketchy and more likely to be based on text-book material than on analyses of industry. Teachers were expected to know how to analyze their own

TABLE 4

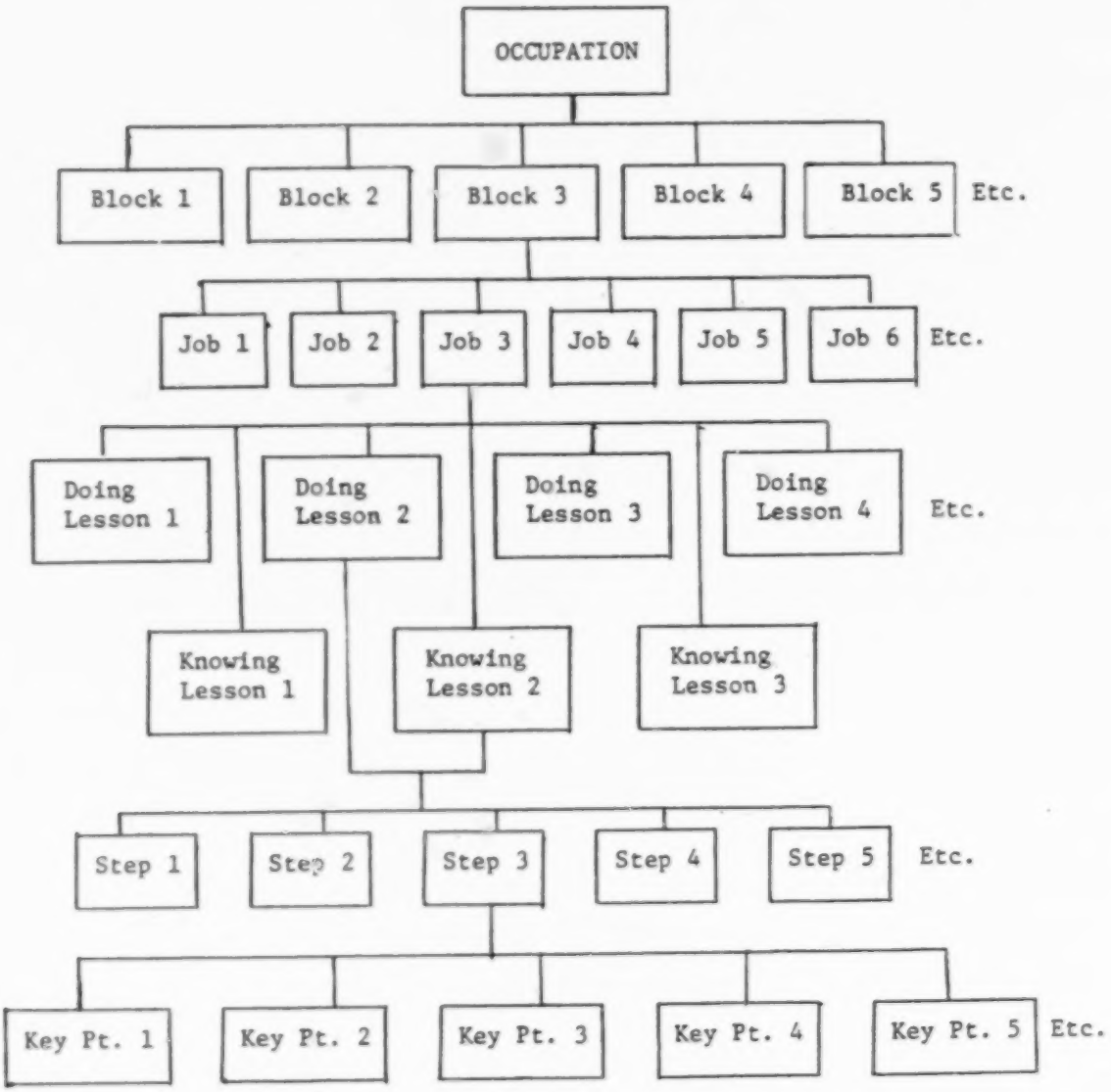
OCCUPATION
Block 1
Block 2
Block 3
Block 4
Block 5
Etc.
Job 1
Job 2
Job 3
Job 4
Job 5
Job 6
Etc.
Doing Lesson 1
Doing Lesson 2
Doing Lesson 3
Doing Lesson 4
Etc.
Knowing Lesson 1
Knowing Lesson 2
Knowing Lesson 3
Step 1
Step 2
Step 3
Step 4
Step 5
Etc.
Key Pt. 1
Key Pt. 2
Key Pt. 3
Key Pt. 4
Key Pt. 5
Etc.

TABLE 5
AN INSTRUCTIONAL ANALYSIS OF CARPENTRY
(Fr[illegible]klund Method)

Jobs (Completed Units of Work)

Operations (Teaching Lessons) How to:		Stake out Bldg.	Form Step Footer	Wall Forms	Column Forms	Step Forms	Curved Walk Forms	Erection of Sec. Forms	Assemble a Built-up Girder	Install T-Sill	Install L-Sill	Install Joists	Cut & Inst. Cross Bridging	Cut & Inst. Solid Bridging	Frame a Stairwell	Frame a Wall Section	Frame a Door Opening	Frame an Arch Opening	Layout & Cut Common Rafter	Layout & Cut Valley Rafter	Layout & Cut Hip Rafter	Layout & Cut Jack Rafter	Frame Chimney Opening	Frame Gable Dormer
1	Plan a Procedure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
2	Read a Drawing	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3	Make a Bill of Mater.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
4	Check Del. Material	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
5	Make a Plan	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
6	Drive & Draw Nails	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6					6	6
7	Layout Square Cuts	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7		7			7	7
8	Test for Squareness	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8		8	8		8	8
9	Layout Patt. on Stock						9		9			9	9	9	9	9	9	9	9	9	9	9	9	9
10	Saw to a Line	10	10	10	10	10	10	10	10	10		10	10	10	10	10	10	10	10	10	10	10	10	10
11	Make a Butt Joint		11	11	11	11	11	11	11	11	11	11		11	11	11	11	11					11	11
12	Test for Level	12	12	12	12	12	12	12	12							12	12	12						12
13	Guide with Pencil		13	13	13	13	13	13																
14	Sight for Straightness	14	14	14	14	14	14	14	14	14	14	14			14	14	14	14	14	14	14	14	14	14
15	Snap a Chalk Line		15	15	15		15	15	15	15	15		15	15		15								15
16	Plane Edge Grain																							
17	Plane End Grain																							
18	Saw Curves						18																	
19	Layout & Cut Material					19	19																	
20	Smooth w/Sandpaper																							
21	Set a Nail																							
22	Toe Nail					22	22			22	22	22	22	22	22	22	22	22						
23	Trim & Pare w/Chisel																							
24	Install Scaffolding			24	24			24														24	24	24
25	Remove Scaffolding			25	25			25														25	25	25
26	Fasten with Screws																							
27	Read Framing Square																		27	27	27	27		27
28	Layout Joints											28												
29	Layout Studs			29												29								
30	Cut & Install Brdng.												30	30										
31	Install Termite Shield									31	31													
32	Build Corner Post															32								
33	Layout Floor Opening															33								
34	Build T-Post															34								
35	Install Batter Boards	35																						
36	Cut & Inst. Fire Stops											36				36								

occupations for course content and develop their own personal curriculum guides based upon this analysis.

Today, of course, we have V-TECS catalogs, Ohio Analysis Guides, Colorado Analyses, and numerous other materials all following varied analytical systems. Additionally, many commercial curriculum guides are available, which are built upon analyses of industrial occupations. The Mid-America Curriculum Consortium has been very instrumental in the development of such ready-made curriculum materials. These guides are very well done and eliminate the need for individual teachers to develop volumes of individual materials. Nevertheless, the process of analysis and curriculum development is now being done by the experts. Teachers no longer perceive a real need to develop skills in analyzing their own teaching content.

There are two problems which are emerging as a result of the increased use of commercial materials. The first problem has to do with an apparent decline in the use of analysis as a teaching tool. Many teachers are becoming so completely reliant upon purchased materials that they miss out on the opportunity to be constantly "thinking analysis" in the course of the teaching process.

Let us hypothetically examine what Trade and

Technical teachers actually do in the course of a typical three hour block of time. Following the teaching of any needed related technical information, students proceed to the laboratory where one or more demonstrations are given. Here the teacher must be utilizing a high degree of analytical thinking in terms of steps (topics); key points; safety precautions to observe, check points, etc. The point here is that, without some kind of logical mental organization on the part of the teacher, the learning prcoess is seriously inhibited. Following the demonstration(s) students are assigned various jobs to perform. At this point, it becomes critical that teachers be able to "think analysis" on their feet. By observing students at various locations in the laboratory the teacher should immediately be able to note (1) the procedures being followed in terms of a step-by-step approach, (2) the degree to which key points relating to the major steps are being practiced, (3) the practice of safety as related to the steps and key points used, and (4) the students who have reached a check point in a job assignment.

When fifteen students are working at perhaps eight or nine different tasks, the ability to make sweeping eye movements periodically and observe the exact progress being made by each student

becomes very difficult without a thorough background in the practice of analysis as a teaching and management tool -- indeed quite a different concept than planning content with the use of commercial materials. Essentially, teachers must know the cumulative order of jobs, major steps, key points, check points, and safety precautions so thoroughly that there is no room for error.

Although there are a large number of factors which influence quality teaching, it is extremely important that every teacher develop the ability to be aware of exactly (1) Who is doing what? (2) How long? (3) What step(s) are being completed? (4) Are key points and check points being observed? and (5) How well? It appears obvious that the teacher who is well versed in occupational analysis will automatically be able to think in the manner described. Such a teacher will obviously be able to maintain an orderly class and be more time efficient than one who cannot perceive laboratory learning as an analytical process. Real occupational analysis then, is not simply a breakdown of content for curriculum development but also becomes a habitual manner of thinking.

Furthermore, with the rapid and constant advances in our technology, the teacher must

learn to be flexible in reanalyzing content, as necessary, to stay current with changes in industry. Teachers who have never acquired this ability to develop good analysis techniques will no doubt, find it easier to continue teaching the same content in the same way.

The question now becomes one of how much the Trade and Technical teacher educator is doing to enhance the process of "think analysis" among beginning teachers. Several concommitant questions are related to the main issue. Do teacher educators see analysis only as a tool for curriculum development rather than as a methodology in its own right? Do commercial materials cause teachers to become followers instead of analytical thinkers? Are we really devoting enough time to "think analysis" in a combination analysis-curriculum course or are we relying to a great extent on prepared materials for the analysis segment? Certainly it opens up the question of whether or not occupational analysis, as a separate course in its own right, should be considered archaic or whether new vitality should be given to this phase of Trade and Technical Education.

Even though a majority of teacher educators still see a need for utilizing analysis as a teaching tool there is still a problem of convincing vocational directors, vocational principals and others in

the administrative community of the need. This author has found that administrators as a group appear to feel that there is little need for an analysis inservice course because teachers already have adequte commercial materials to work from. Furthermore, administrators who are not well versed in occupational analysis appear to feel that a breakdown of competencies, as delineated through a state mandated competency based system, is all that is necessary in the analysis process. Any further breakdown i.e., lesson plan titles, steps, key points, safety etc. should simply be a natural outgrowth of the process -- simply doing what comes naturally.

The second problem which appears to be emerging from the increased use of commercial materials is a trend toward greater complexity and abstractness with a resulting decline in usefulness among practitioners. The newer systems of analysis are very well conceived, but when increased sophistication is involved, teachers find it more difficult to fit the analysis to practical situations where time restraints are a reality. Today, we are dealing with terminal performance objectives, enabling objectives, criterion referenced measures, performance level evaluation sheets for individual tasks, and a host of other abstractions

which tend to become very time consuming. There is certainly nothing basically wrong with these contemporary approaches -- its just that sometimes we tend to hone something to such a fine point, that the typical non-degree T & I laboratory teacher with a minimal or non-existant research background is "turned of" by an abstract system. Maybe we need to start listening more to teachers and less to research and development people. A basic, simple system without all the embellishments, as originally designed by Fryklund is certainly more likely to be utilized by the average teacher than a more sophisticated system which is harder to comprehend from a practical standpoint. Please see comparisions of traditional and a selected contemporary analysis system shown in Tables 6, 7, and 8. Furthermore, any increased complexity, no matter how well conceived, usually causes a system to be more time consuming and results in a greater proliferation of paper work. When this occurs, it only follows that there is less time left for teaching and class supervision. Coupling more individualized instruction with the newer analysis systems has added to the complexity of the situation.

A case in point is the use of rating scales as criterion referenced measures for psychomotor competencies (See Table 9). This is a popular

concept in some of the newer type of analyses, particularly as it relates to a true Competency Based Vocational Education (CBVE) program. A good rating scale used to measure a single task accurately and objectively can include as many as fifteen or twenty factors. With the exception of welding, drafting and brickmasonry, where the same basic evaluation factors are utilized for most major competencies, a Trade and Technical teacher would need to develop as many rating scales as there are tasks. It is not uncommon to have 150 or more tasks in a two year curriculum. With an average of 15 students in class, it is conceivable that teachers could utilize over 2,000 rating sheets during an entire course. This, of course, becomes an impossibility and teachers either rebel or pretend to be using a contemporary system, when in actuality they are using a less complex method with which they are comfortable.

Insert Tables 6,7,8 & 9 here

One more example might be use of the performance objective, a fundamental element of contemporary CBVE analysis. Note that there are three parts to the performance objective; (1) conditions (2) performance, and (3) standard. In Trade and Industrial Education we have made wide use of job sheets for over fifty years.

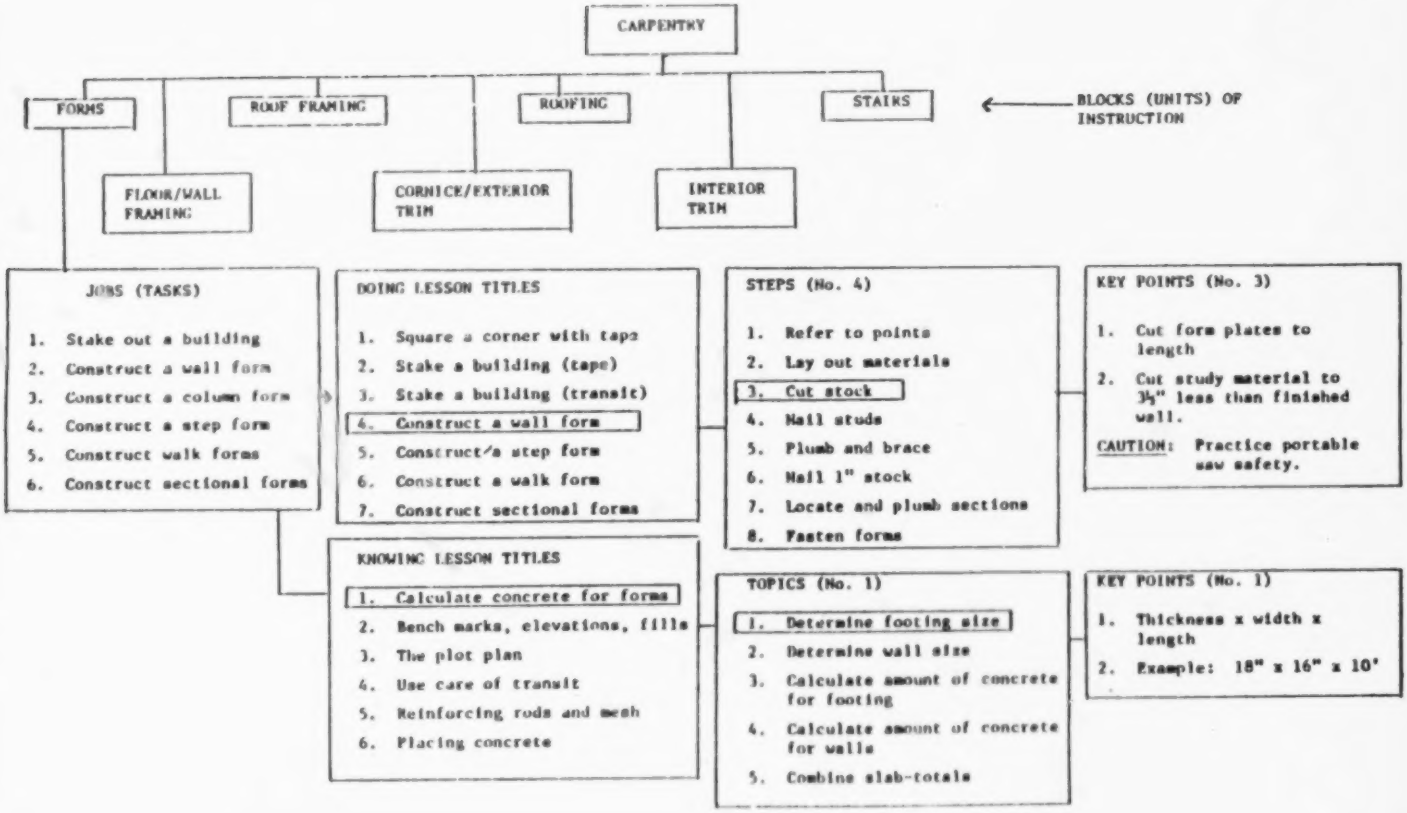
CARPENTRY
FORMS
ROOF FRAMING
ROOFING
STAIRS
BLOCKS (UNITS) OF INSTRUCTION
FLOOR/WALL FRAMING
CORNICE/EXTERIOR TRIM
INTERIOR TRIM
JOBS (TASKS)
1. Stake out a building
2. Construct a wall form
3. Construct a column form
4. Construct a step form
5. Construct walk forms
6. Construct sectional forms
DOING LESSON TITLES
1. Square a corner with tape
2. Stake a building (tape)
3. Stake a building (transit)
4. Construct a wall form
5. Construct a step form
6. Construct a walk form
7. Construct sectional forms
STEPS (No. 4)
1. Refer to points
2. Lay out materials
3. Cut stock
4. Nail studs
5. Plumb and brace
6. Nail 1" stock
7. Locate and plumb sections
8. Fasten forms
KEY POINTS (No. 3)
1. Cut form plates to length
2. Cut study material to 3½" less than finished wall.
CAUTION: Practice portable saw safety.
KNOWING LESSON TITLES
1. Calculate concrete for forms
2. Bench marks, elevations, fills
3. The plot plan
4. Use care of transit
5. Reinforcing rods and mesh
6. Placing concrete
TOPICS (No. 1)
1. Determine footing size
2. Determine wall size
3. Calculate amount of concrete for footing
4. Calculate amount of concrete for walls
5. Combine slab-totals
KEY POINTS (No. 1)
1. Thickness x width x length
2. Example: 18" x 16" x 10'

TABLE 6

THE FRYKLUND SYSTEM OF OCCUPATIONAL ANALYSIS

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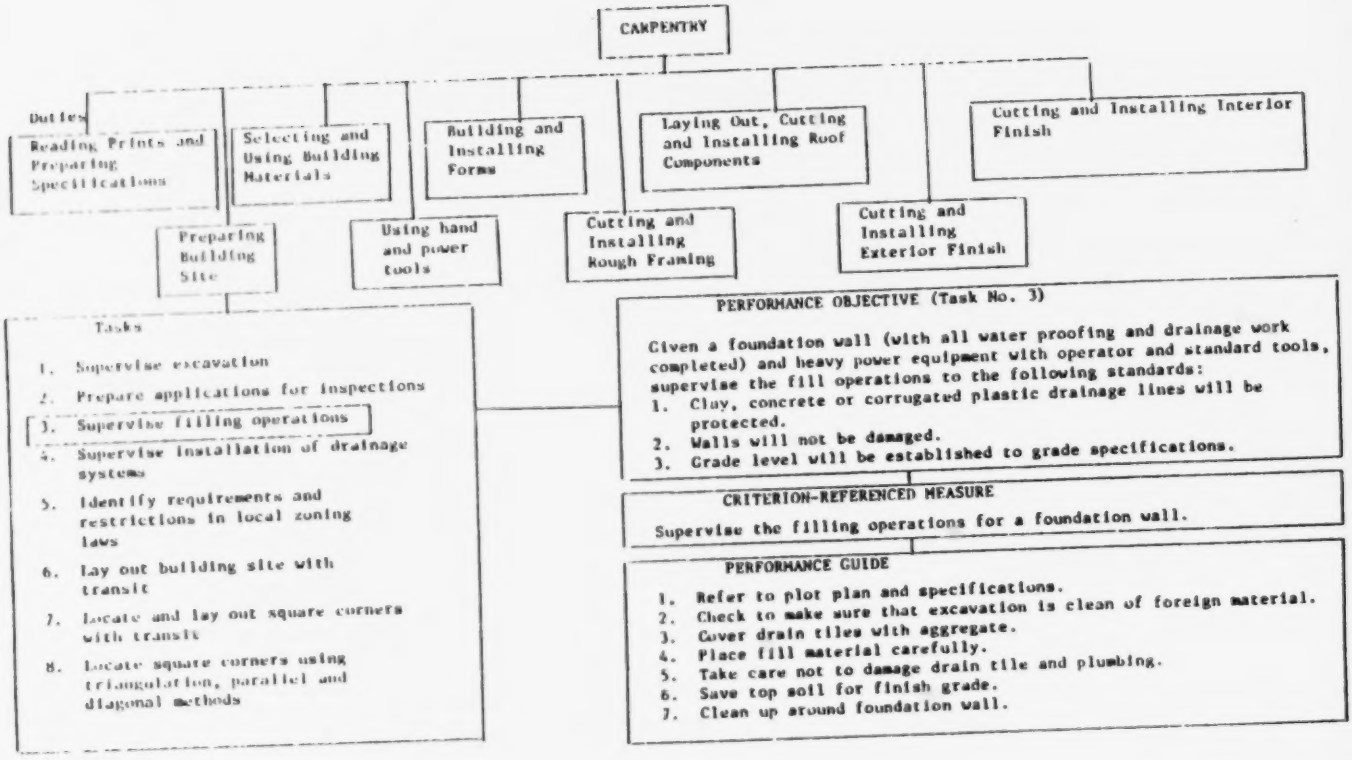
CARPENTRY
Duties
Reading Prints and Preparing Specifications
Selecting and Using Building Materials
Building and Installing Forms
Laying Out, Cutting and Installing Roof Components
Cutting and Installing Interior Finish
Preparing Building Site
Using hand and power tools
Cutting and Installing Rough Framing
Cutting and Installing Exterior Finish
Tasks
1. Supervise excavation
2. Prepare applications for inspections
3. Supervise filling operations
4. Supervise installation of drainage systems
5. Identify requirements and restrictions in local zoning laws
6. Lay out building site with transit
7. Locate and lay out square corners with transit
8. Locate square corners using triangulation, parallel and diagonal methods
PERFORMANCE OBJECTIVE (Task No. 3)
Given a foundation wall (with all water proofing and drainage work completed) and heavy power equipment with operator and standard tools, supervise the fill operations to the following standards:
1. Clay, concrete or corrugated plastic drainage lines will be protected.
2. Walls will not be damaged.
3. Grade level will be established to grade specifications.
CRITERION-REFERENCED MEASURE
Supervise the filling operations for a foundation wall.
PERFORMANCE GUIDE
1. Refer to plot plan and specifications.
2. Check to make sure that excavation is clean of foreign material.
3. Cover drain tiles with aggregate.
4. Place fill material carefully.
5. Take care not to damage drain tile and plumbing.
6. Save top soil for finish grade.
7. Clean up around foundation wall.

TABLE 7

A CONTEMPORARY SYSTEM OF OCCUPATIONAL ANALYSIS
(V-TECS)

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TABLE 8

PROS AND CONS OF TRADITIONAL AND CONTEMPORARY SYSTEMS OF ANALYSIS

Criterion	Traditional Fryklund Analysis	Contemporary V-TECS Analysis
1. Type of content	A breakdown meant for use in a training situation. "Jobs" are designed for teaching purposes.	A breakdown of tasks done by the worker in industry. May or may not be "teaching jobs". Many tasks are too broad to use as instructional units.
2. Evaluation	Establishing a standard for each job is not part of the system. This is, however, done by the instructor when utilizing the job sheet. This is a weakness in the traditional system.	Standards are set in the performance objective. Most tasks, however will require the use of a more comprehensive rating scale, if real achievement is to be measured.
3. Use as a recording system	A record of jobs completed is maintained in the same way as contemporary systems.	An individual vocational education plan is maintained for each student.
4. Use of the system with varying ability levels	An individualized plan is made for each student, based upon the analysis. Larger jobs may be broken down into simpler operations.	Same as traditional.
5. Keeping up-to-date	This is left to the individual teachers. A new analysis should be done every 3 to 5 years. This is a weakness in the traditional system.	V-TECS catalogs are based on input from the incumbent worker.

TABLE 8 Continued

PROS AND CONS OF TRADITIONAL AND
CONTEMPORARY SYSTEMS OF ANALYSIS (CONT.)

Criterion	Traditional Fryklund Analysis	Contemporary V-TECS Analysis
6. Utilization in the classroom and laboratory	After the analysis is complete, paper work involves only a record of jobs completed.	Utilization of a rating scale for each separate task takes away from total teaching time.
7. Staff development	Teachers who perform their own analysis learn a great deal about their occupational area and ways of presenting it.	Utilization of an analysis made by others may or may not fit a particular teaching situation. Furthermore teachers are not given the opportunity to grow in organizational techniques.

TABLE 9

INSTRUCTOR RATING SCALE*

TASK: LAYOUT, CUT AND INSTALL COMMON RAFTERS FOR EQUAL PITCHED ROOFS

ACTIVITY	RATING	
	A	U
1. Checked prints and details		
2. Determined building span		
3. Calculated rafter length		
4. Determined plumb and plate cuts		
5. Selected marking pattern		
6. Laid out top plumb cut		
7. Established layout line		
8. Laid out birds mouth cut		
9. Laid out tail for cornice		
10. Checked calculations and layout		
11. Cut rafter pattern		
12. Marked required rafters		
13. Cut out rafters		
14. Layout ridge and wall plate		
15. Erect rafters in pairs		
16. Plumbed gable rafters		
17. Checked alignment and nailing		

Vocational Education Consortium of States (1979) Carpenter V-TECS Catalog, Atlanta: American Association for Instructional Materials, pp. 400-401.

The first two parts of the performance objective are found on the job sheet for a particular task. The standard for most T & I tasks, if stated realistically, is far too complex to list as part of the typical performance objective. Note in the following objective what a teacher would actually be required to write if the standard were stated accurately.

SAMPLE PERFORMANCE OBJECTIVE

Given a hot water heating system and plumbing tools and supplies, install a water circulating pump in a system. Complete work must conform to the following standards:

A. Pump is in position specified by manufacturer.
B. Pump operates properly when activated.
C. Pipe joints do not leak when pumps are activated.
D. Finished work is neat in appearance.
E. Trainee left work area clean.
F. Work was performed in established time limit.

Close inspection would indicate that the teacher who can think analytically would probably include several other standards which are probably assessed subjectively. Inasmuch as it is impractial from a time standpoint to include all of the things upon which to truly evaluate each psychomotor task, the performance objective will very often indicate gross or superficial standards such as (a) to please the patron (b) so engine runs smoothly, or (c) to meet manufacturer's specifications. Such shortcuts, of course, defeat the whole idea of utilizing a measurable

standard.

The question of how much complexity can be justified in terms of the bottom line goals to be achieved becomes an important consideration when assessing the merits of any analysis system. There are numerous other factors which enter into the modern concept of analysis such as time analysis, adaptability to selected Trade and Technical areas, etc., however, this discussion, being general in nature, cannot address the entirety of all issues involved. Nevertheless a proper closure would offer these conclusions:

1. Occupational analysis serves two purposes (a) to aid in developing the curriculum, and (b) to aid teachers in "thinking analysis" as a teaching and management methodology.

2. The second of the aforementioned goals should be an extremely important aspect of any Trade and Technical teacher preparatory program.

3. Although teachers no longer have a need to analyze an entire program for curriculum development purposes, they should be provided the practice in performing an analysis so that they fully understand the concepts involved.

4. State Departments of Education and some administrative groups are concerned with analysis primarily as a basis for curriculum development and need to be oriented to the goal of analysis as a teaching and management methodology.

5. No matter how good a system is, constant increases in complexity will eventually lead to a decline in usefulness.

6. Teachers become "turned off" when a system becomes so time consuming that it gets

in the way of providing good instruction.

7. It is sometimes possible to "improve on something until it reaches a point of diminishing returns, -- these returns being the achievement of boys and girls,-- men and women.

8. Trade and Technical Education teachers have had a simple, practical, and truly superior analysis system for over forty years. We originally pioneered the concept. Our heritage should not be lost. Trade and Technical people need to have more influence on contemporary issues in teaching methodology and curriculum development.

9. Let us not be influenced by what other vocational disciplines think is right for them. Decisions for our programs should be made by seasoned Trade and Technical teachers with the cooperation of industrial advisory committees.

10. There must be a careful balance between level of sophistication and level of practicality. Too much of one or the other will tend to decrease teacher productivity.

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